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Romance of Big Business Series
NUMBER FOUR

Musical Strings and Pharmaceuticals

Written for the
Children of America

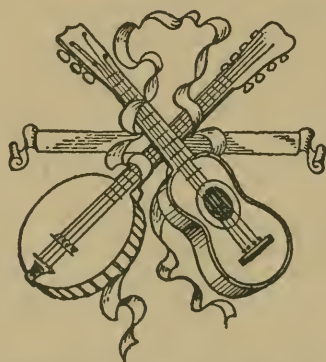
By
Emma Tolman East
1919



ARMOUR'S BUREAU OF AGRICULTURAL RESEARCH AND ECONOMICS
R. J. H. DeLOACH, Director UNION STOCK YARDS, CHICAGO, ILL.

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Armour's Bureau
of Agricultural Research and Economics

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Musical Strings

Where is the Cat Farm?

SOMEWHERE there is a source for the huge supply of strings made for numberless musical instruments, for the racquets of an army of tennis players, for the fine, strong ligatures which surgeons use when they make a neat seam in a human body, for all the different things we have always called "catgut."

It is too bad to spoil a trade name so old that no one knows just where it came from; but really, cats have no more to do with the manufacture of "catgut" than they have with the making of a "catboat" or the materials in a "cat-o'-nine-tails!" No more than sand has to do with "sand" paper.

If all the household pets and all the homeless alley-cats in the world were caught and killed they would still have nothing to do with the manufacture of catgut, for there is not an atom of their poor little bodies that is ever used in making it.

Instead of cats it is Mary's little lamb and the rest of the sheep relatives which furnish the material for all the catgut in use today.

No one seems to know who first discovered that the thin, rubber-like material of animal intestines was the finest thing in the world for



musical strings, but they have been in use for hundreds and hundreds of years.

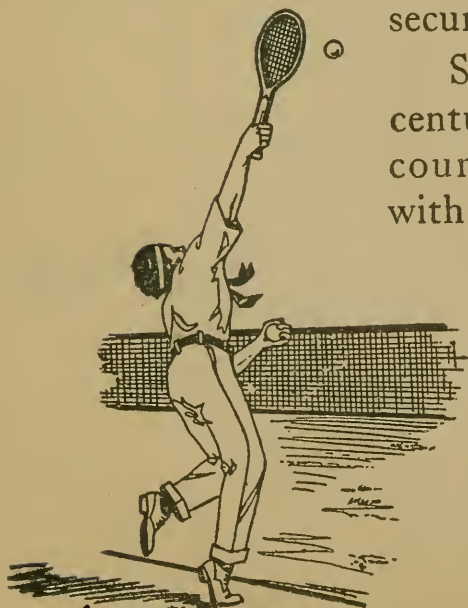
So far as the records go, the first violin strings were made in Italy, the home of music, and this sheds a very little light on the name. There was a time when a violin was called a "kit," and the strings for it were called "kit-strings." As these strings were sometimes of wire and sometimes made from intestines, it is easy to suppose that the difference was shown by calling one of them "kitgut." More than likely our present name of "catgut" has come from this, though no one really knows.

For a good many hundred years the making of catgut was done almost entirely in Italy and they had no trouble in supplying all the musical instruments with the strings needed.

But as the world grew richer and better and the people everywhere began to understand music and art and literature, more musical instruments were demanded and more catgut was needed for them than the small factories of Europe could secure the intestines to supply.

So, in the latter part of the last century, the manufacturers in the old countries began to call on America, with its great packing industries, to furnish them with the materials for making their musical strings.

In this way great quantities of sheep intestines were shipped to the catgut factories in Europe, made into strings there, and shipped back to be used in this



country, with freight and express charges for both journeys, custom house duties, packing, and a good many other items of expense added to the first cost of them.

It did not look like good business to Armour and Company or fair to those who bought, so, a few years ago—in 1912, to be exact—they decided to manufacture their own supplies of intestinal material into the finished product, instead of sending them to Europe to be made up and returned.

In the beginning only a small factory was built but the very best of machinery was installed and skilled workmen and managers placed in charge.

Little by little the American string, made in the little Armour factory from the finest materials while they were in the best possible condition, began to find favor. Some great players who tried them said they were better than any string made anywhere else and it was not long until players generally began the use of strings made in this country.

So the little business began to grow up and act like a big business and to have all the orders it could fill.

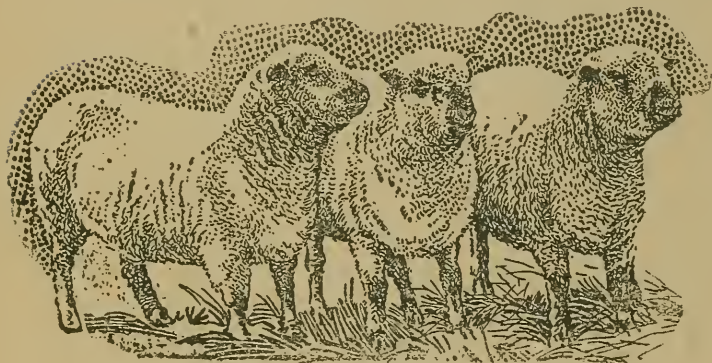
Then came the great war and in a little while no musical strings and not much else could be brought from Europe.



So they used Armour strings and found that if there *was* any difference the American string was the better of the two—and suddenly the demand *was* so great that the little catgut factory grew up with a rush and became a big catgut factory, which is still growing.

From a Ba-a Sheep to an E-String

When a sheep is dressed part of the intestines are sent to the sausage casing department to be made into containers for different kinds of sausage, but the small intestine, which is about the size of a lead pencil, and eight yards long, is sent to the string factory to be manufactured into various products, such as musical



i n s t r u m e n t
strings, surgical
ligatures or cat-
gut, tennis rack-
et strings, clock
cords, loom gut,
belt lacings,
belting and the
like.

First they are drawn over dull blades which scrape off all shreds and foreign matter, then they go to more baths—both chemical and plain—until they are thoroughly clean and transparent.

After the splitting of the intestine, which is done by a skilled workman who draws the moist, slippery material over a wooden finger-shaped instrument, in the center of which there is a sharp blade vertically set, the little strands are again cleaned by placing them in a chemical bath in a machine that looks some-

thing like a washtub with many wringers attached, through which they pass many times.

Several of these slender, elastic strands are woven into one musical string of ordinary size and the spinning of each one requires the art of two skilled and careful men who know exactly how many turns the old-fashioned spinning wheel must make and just how the wet strands or half-guts must be fed to the string so it will be of even size and strength.

After the spinning the strings are put on frames in the drying room and left until they are thoroughly dry and "seasoned," which takes from ten to sixteen days.

They are rough and unfinished-looking when they come off the frames, so the skilled worker comes in again, stretches them on a machine which keeps them turning while he goes back and forth, from end to end, polishing them with sand paper and chalk until they are smooth and glistening. Hand polishing is also used extensively. Just as the wool of some sheep is different in color from that of others, so the intestines, too, vary in shade. But while some are lighter and some are darker, color makes no difference in either quality or tone.



If the string is to be artificially colored, as is desirable for some uses, such as ukulele, harp, and tennis strings, this is done after it leaves the spinning-wheel and before it goes to the drying frames.

After the drying and polishing there is little more, in a manufacturing way, for them to undergo; but there

are still some delicate processes of testing them for strength and size, then they are cut into necessary lengths, coiled, inserted in envelopes, boxed, labeled and sent to market.



Splitting

This, in short, is the method of making all strings for musical instruments, but of the hundreds of little delicate processes which make the difference between the many kinds and grades put on the market, very little can

be explained in a general story without becoming tedious and technical.

All of these strings are made in different sizes and of different grades to meet the requirements of the trade.

The harp strings are, perhaps, the most wonderful of all, for sometimes a hundred or more of the little gut strands are spun into one string.

And, if it requires art and skill to weave a dozen strips into one small string, it is easy to see what it means to spin a hundred strands into a perfect string, only a little larger, that is equally strong and close throughout its whole length.

When one listens to the full, mellow tones of a harp as it responds to the touch of gifted fingers, it is difficult to realize that it would be utterly impossible without the help of hundreds of little woolly sheep, who live their lives and lay them down in order that the world may be better and happier!

Then, in addition, there are strings that are colored, strings that are treated so as to make them as nearly moisture-proof as anything of the sort may be and strings that are made to stand the dry weather.



Sorting

Then there are the drum-snares—which are the little families or sets of strings drawn across the drum head to produce the desired volume of sound.

The drum heads, too, are a packing house product, for these are made of calfskin, goatskin, or buck.

Naturally there are different sizes of drums, so there must be all sizes of heads for them—little drum heads and big drum heads and medium drum heads—and all these must be made in different weights

and grades and even, sometimes, of different materials.

And there is the problem of tennis strings.

Many of you know a great deal about this and can talk wisely of the relative merits of "domestic" and "imported" and "Oriental" brands.

But did you know that the heavy "Oriental" string which looks so strong and durable and costs so little, is not made of gut at all?

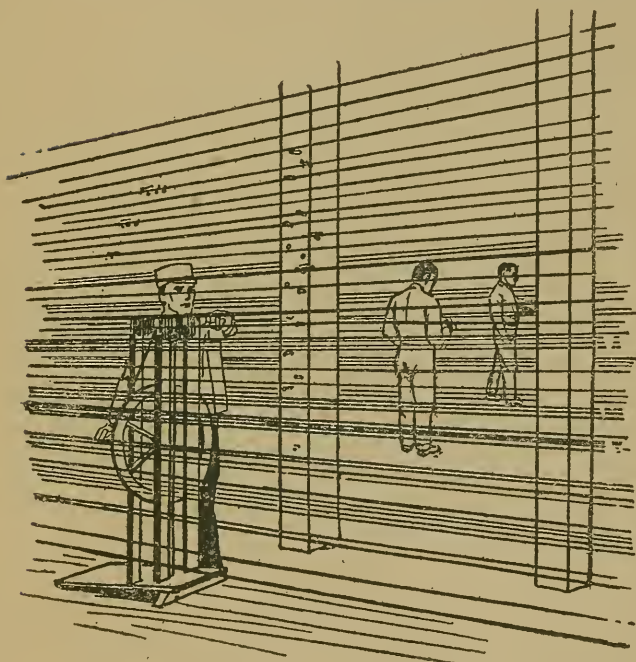
It is "Oriental" all right, for it comes from Japan, but there it is made of heavy sinews and tendons

which have no life or elasticity, instead of the responsive intestinal material which has a quality only to be described by the word "resilient."

There is as much difference between the tennis string made of sheep intestines and the one made of sinews, as there is between a rubber ball and one made of wood. One

seems "alive" to the ball when it strikes it, the other is dead in its frame.

But, at the string factory of Armour and Company, where there is such a quantity of high-grade material, tennis strings are made from intestines only, and sinews and tendons are used in making glue.



Spinning

Many other things, mostly for mechanical and manufacturing uses, are made from the slender intestine of the sheep, but the most interesting of all are the fine ligatures or threads which surgeons use for taking stitches in the human body.

It is only a few years since these were made of linen, or cotton, or even of fine wire—and then it was almost as much pain and trouble to take them out as to put them in. But the delicate “gut” ligature, made from the strong, silky-smooth side of the narrow sheep intestine, is taken up or absorbed by the flesh of the patient as he recovers, so that by the time he is quite well the stitches have all disappeared.



These required an endless amount of study and years of experimenting with different methods of making and finishing, before they became the satisfactory ligature the surgeons know today. The first ones, used in an experiment on guinea pigs which had been mercifully chloroformed until they knew no pain, absorbed too soon because they were not quite hard enough, and the blood absorbed them too quickly.

The next ones went to the other extreme and were so firm that they did not absorb at all and had to be taken out the same as linen, or wire ligature.

But the doctors and scientific men, who were studying every means of relieving pain then—this was a great many years ago—the same as they are now, believed they were on the right track and finally a “gut” ligature, as nearly perfect as it is possible to be, was ready for use and is one of the products of Armour and Company.

These ligatures, like other strings, are put up in different ways, some being finer than others and some being sealed in small glass bottles holding an “antiseptic” fluid, so that they may be used without further preparation or sterilizing if there is a sudden need, an emergency call, where only quick action will save life.



These, too, are gauged for size, tested for strength, numbered and labeled, before putting them on sale.



Pharmaceuticals

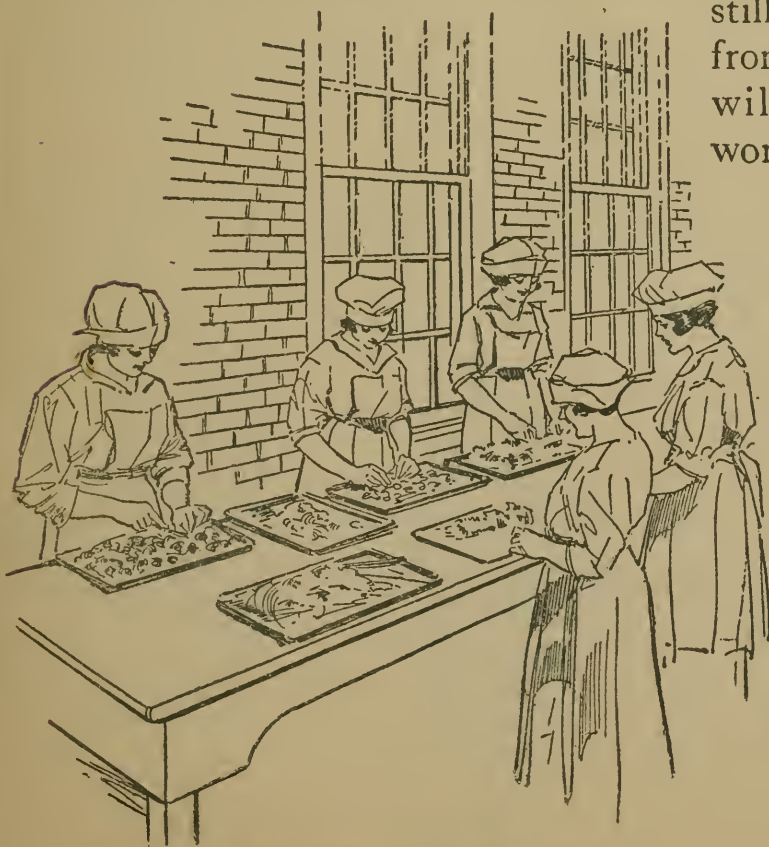
Making an Ally of Nature

Knowledge and patience and skill are needed for the making of all these things, but far, far more of these are needed to search out and separate the natural, helpful things hidden in the organs and glands of a food animal's body.

Just as the heart and lungs of an animal do the same work that they perform in a human body, so the wonderful and delicate glands do much the same work in both. And because, oftentimes, these glands are but little understood and their work in both animal and human is very much of a mystery, there seems always a wide field for study and much, very much,

still to be learned from them that will benefit the world.

Much as has been done in this way in the last few years, there is still much to be learned and no one can tell what secrets still lie hidden in the bodies of



Selecting and Preparing Glands

food-animals nor what benefits they will yet bestow on mankind.

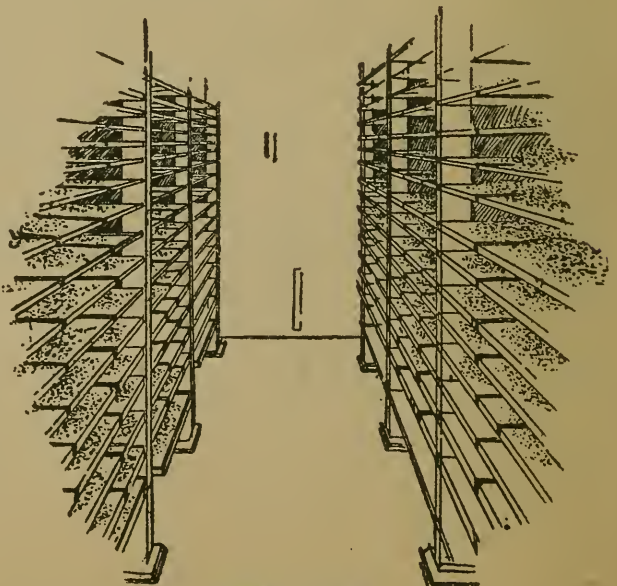
But where, a few years ago, all this fertile field of research went to the waste pile and was lost, now everything is saved and the light of science has done wonders in redeeming it.

In this way it has been learned that sometimes, when a gland in a human body becomes sick or tired, the same one in a healthy animal's body is able to give up its strength and power in a helpful way.

Sometimes a little gland manufactures or "secretes" as we say, a fluid of some sort that is necessary to health. Perhaps even the doctors and scientists cannot tell just what this fluid is or why it is so needful—they only know that it *is*. Then, if something happens to the tiny gland and it can no longer manufacture its helpful product, illness results and no one knows just what to do or how the gland can be renewed and made to carry on its work again.

So the food animals have been called on to give up their glands—sometimes working in one way, sometimes in another, but always with the thought of helping the sick or useless one in a human body.

These things can hardly be called "medicines," any more than a roast or a chop would be, for they are almost always used to supply



Pepsin Drying

something that the human body lacks and that the food animal can give—just as it gives food and other things that men and women need.

Some of these things have been known and made in small quantities for a great many years but, until the packing houses, with their great numbers of freshly-killed animals, began the manufacture of them, the demand was always greater than the supply.

Others are comparatively new and require such huge quantities of material for study and experiment and for manufacture, that they are possible only where large numbers of animals are killed.

There are groups of such remedies, all made from the same glands, some of them being the simplest preparations and others made by separating each tiny particle from those that differ from it until all the different atoms are placed by themselves and each class is ready to do a work of its own.

If you could take a loaf of bread and separate it by chemical processes, into flour and milk and sugar and salt and yeast, you would be doing, as nearly as I can explain it, what the chemists do to a gland they know contains several different “ingredients” or what they call “active principles.”

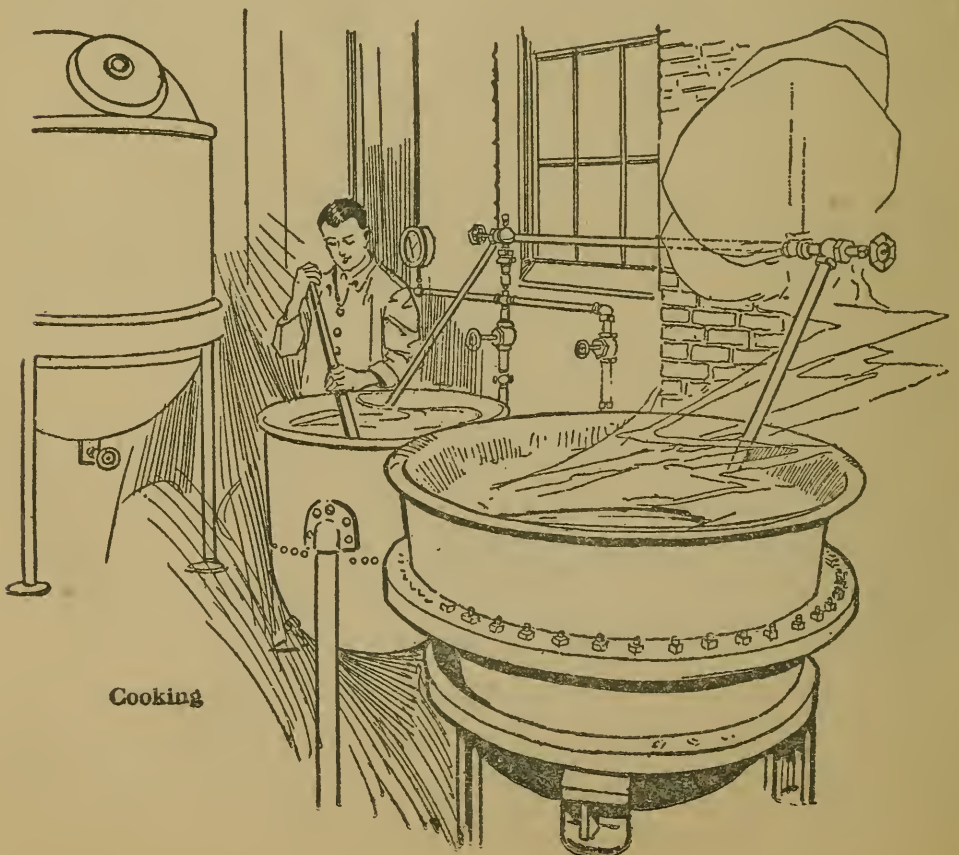
Sometimes they take these “active principles” and put them together again in a different way to make something else the human body needs—just as you might take some of the things you found in the loaf of bread and make them into cake or muffins.

Many, many years of study and hard work have gone into every preparation that is finally accepted by doctors and surgeons—hard work, not only by

those at the laboratories of Armour and Company, but by brilliant men all over the country.

However, as Armour and Company furnishes so much of the material for all this study and experiment and has the means of manufacture, it follows that the final results are largely due to them, though in many cases they consider themselves greatly indebted to others for the work that has been done.

Some of these things are manufactured from glands so tiny that thousands of cattle and more than a hundred thousand sheep are needed to make a single pound, so their manufacture is not possible anywhere but at the largest of packing plants, and the world knew nothing of them until the big plants, with their great numbers of food animals, could develop them.



A Peep at the Preparations

A wonderful "group" of remedies is known as the "suprarenal preparations" and they are made from small glands just above the kidneys of the sheep. (The name itself shows the origin of these remedies for "renal" means kidney and "super," above. "Suprarenal"—"above the kidney.")

One of these called "suprarenalin" is a powerful heart stimulant and requires the glands of 135,000 animals to make a pound of it. Under such circumstances it cannot help being expensive, costing, sometimes, \$5,000 a pound, but fortunately only a little is needed for a dose.

Thousands of lives, especially those of little children who have become weakened by scarlet fever or diphtheria, have been saved by suprarenalin.

At the base of the brain in all animals—in man, as well as in the lower orders—is a little gland known as the "pituitary body" and this is the source of another group of rare remedies used for relieving suffering and giving strength where weakness or "shock" is the greatest danger.

A little gland in the throat of a sheep, known as the "thyroid" gland, is quite similar to one in the throat of a human being. Sometimes the one in the human throat becomes sick and sometimes a child is born whose thyroid gland is imperfect and cannot do its work.

Not a great many years ago there was no help in such cases, but now the gland from the sheep is made to help and sometimes to cure.

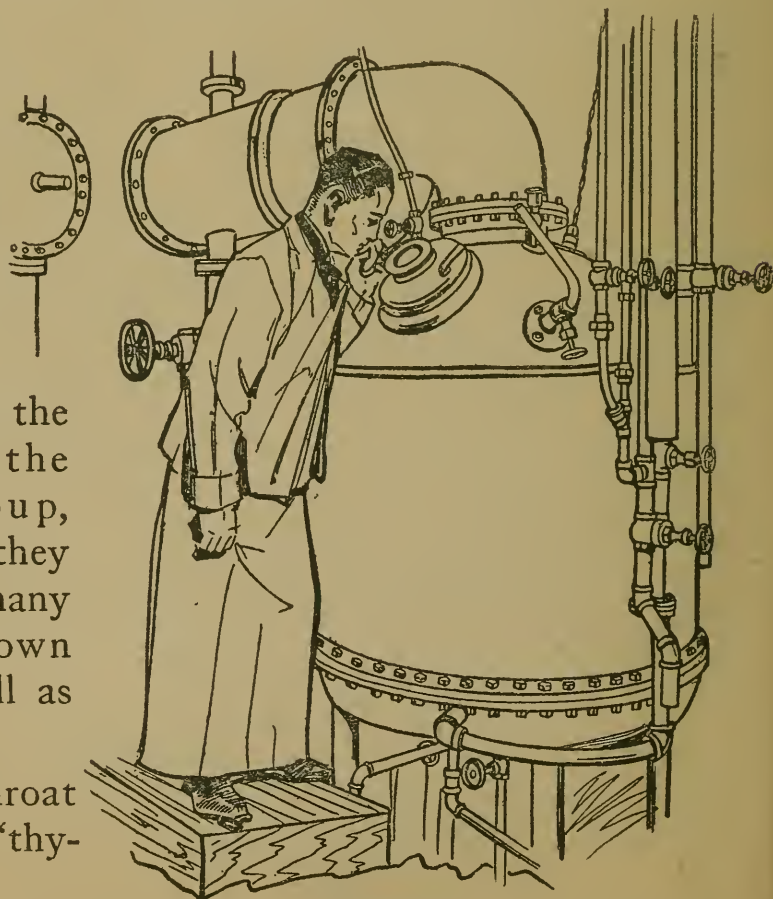
When a child is born with this gland in a useless condition it is sometimes afflicted in various ways and sometimes its brain cannot grow or guide its body. We used to call such children "idiots," "mental defectives," or "feeble-minded."

Today they are very often helped and sometimes made as well as other children by giving the remedy made from the sheep thyroid because it supplies the thing lacking in their own bodies, and because their trouble was not a feeble *mind* but a feeble thyroid gland, whose mysterious secretion or fluid is necessary to every one of us.

Such children must almost always take a little of the thyroid remedy from time to time, so as to keep it circulating in their bodies, just as their own thyroid glands would do if they had them in perfect condition.

This is not the only use of the thyroid group, however, for they are used in many ways for grown people, as well as for children.

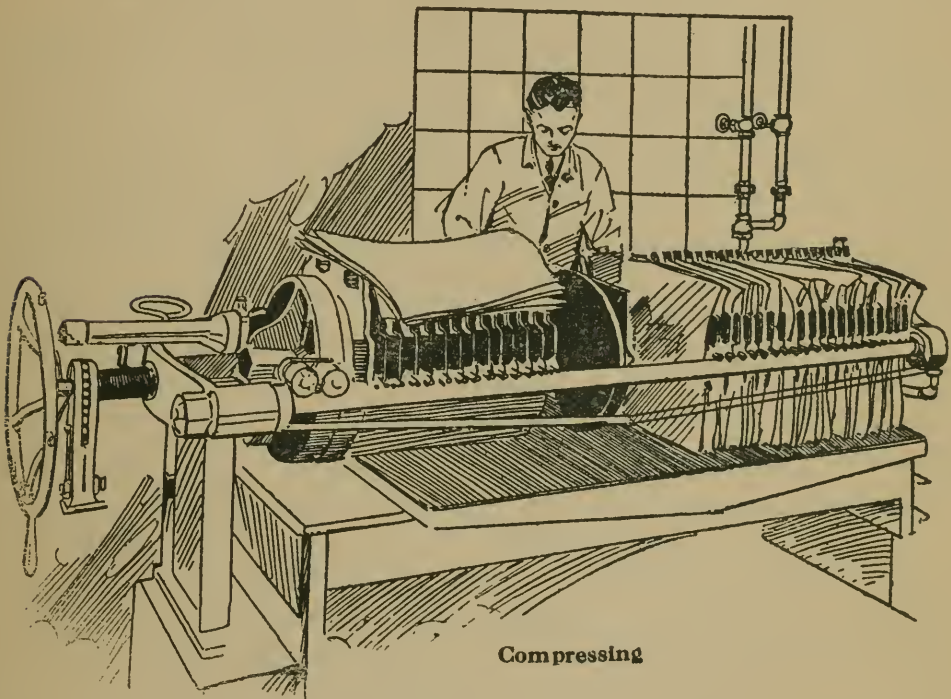
Another throat gland is the "thy-



Condenser

mus” and this is found in all young animals—the human young, too,—but disappears in most of them when they are grown.

Because this gland is so closely associated with *growth* it was soon learned that if it was imperfect or its work was interfered with in any way, growth and development stopped, so the remedies made from the thymus of the sheep are helpful to children who



Compressing

do not grow as they should, whose bones are soft, whose food seems to do them no good.

Like the thyroid remedies, this group has its uses for grown people, too.

During the great war many lives were saved by a preparation made from the brains of cattle, which would check all ordinary bleeding or hemorrhage from wounds or operations.

To make this the cattle had to be killed in a special way and the brain tissue handled with the greatest care and skill. So helpful was it, that it is impossible to even guess how many brave boys were saved by this alone.

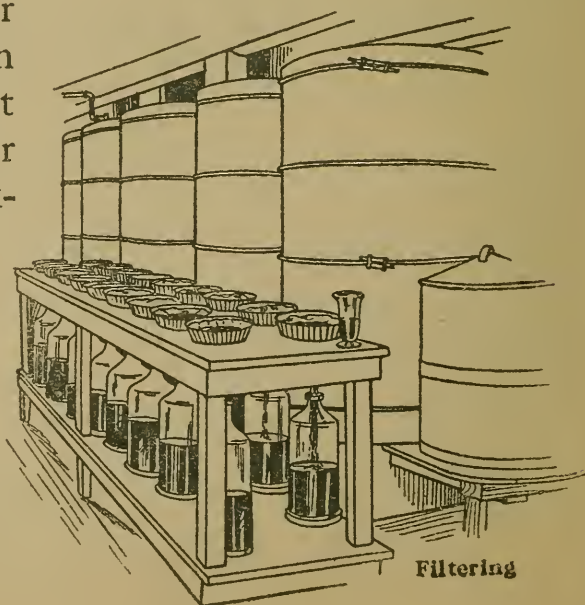
One of the medicines that is no longer spoken of as "rare" because it is well-known and has been made a long time, is "pepsin" which helps in the digestion of food and is found in the lining of hogs' stomachs.

Physicians use it to relieve dyspepsia and other stomach troubles.

"Pancreatin," another remedy long known to physicians, is made from the "pancreas" or sweetbread found inside the hog and this is used to put in the food of delicate babies and of invalids so it will digest easily.

It is different from pepsin, but its power to help in the digestion of food seems just about as great after it has been taken as medicine as when it worked on the food given to the animal in which it was found.

Neither pepsin nor pancreatin had been manufactured to the best advantage when Armour and Company began making them, largely because the business was small and those engaged in it were compelled to gather such materials as they could, here and there. But, like many other things, as soon as



Armour and Company, with their unlimited supply of the best materials to choose from, entered the field, the quality of both of these improved, for, by putting out a high standard of goods themselves, they compelled others to do so, too.

Another useful product of the food animal is oxgall, the greenish fluid in the gall-bladder, near the liver.

This is made into a medicine in tablet form, but it has more manufacturing uses than it has medical. Artists use it in mixing their paints to make them "flow" well and yet to bind or blend all the different ingredients together. It is also used in making indelible inks and pencils and is put into fine varnishes.

As it has a "soapy" quality it is much in demand by cleaners and dyers for many purposes.

Still another, which is more food than medicine, is the "rennet" which comes from the stomachs of calves and is used in making cheese because of its power to digest milk.

One form of rennet is "junket," used for a dainty dessert in almost every family and as an easily digested food for children or for those who are ill.

Perhaps, strangest of all, is the use to



which the small, pebbly stones, sometimes found in the gall-bladder and known as "gall-stones," are put.

These are shipped to Japan where those who are superstitious or who believe in "signs" or "charms" buy them and carry them about in their pockets to bring them good luck, in much the same way as people in this country sometimes hang a horseshoe over the door or carry a rabbit's foot around with them.

And in addition to these more important things, there are a large number of lesser ones made by Armour and Company.

Some of these are in constant demand, some are seldom used, but there are about fifty in all which come from the interior organs of cattle, sheep and hogs to make the world healthier and happier.

Even at that, the science of "animaltherapy" or "organotherapy" as this work is called, is only beginning and every year will see more and more wonderful discoveries made by those who study the vital organs of both lower animals and human beings, so that suffering may be lessened and disease overcome.

All these things, too, have their effect on the price of meat and lard, on sausage and ham. For here again is an income that reduces the cost of handling a food animal



Sealing Tubes

and takes a certain amount off the price we would otherwise pay for a steak or roast.

Even during the great war, when all Europe was calling on the United States for meat and meat products, prices did not rise as much as on many other things which were in less demand, and good meats were always within the means of even those workers who performed heavy, unskilled labor and so received the lowest wages.



In some countries the unskilled laborers do not have meat of any sort very often and when they do it is usually horse-meat or—sometimes—even mule-meat.

Those who work in this country can have the best of food, but not many of us realize that it is the putting of every part and particle of a food animal to its *highest* use that helps to keep the price of meats within reason and makes the American workman envied the world over.

Announcement to Teachers

THIS little booklet has been prepared to meet the urgent demands of the public for a better understanding of the business that it is designed to portray. It has been published for free distribution among teachers, and arrangements have been made with the publishers whereby classes will be furnished at the actual cost of paper and printing, which is approximately three cents a copy.

This series of booklets will comprise six numbers when completed, as follows:

- Book I—Dreams That Came True.*
- II—The Story of a Soap Bubble.*
- III—The Story of Glue.*
- IV—The Story of Musical Strings
and Pharmaceuticals.*
- V—Feeding the Farm.*
- VI—The River of Food.*

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